CLAIMS

1. An article comprising:

an electrical crossbar array comprising at least two crossed wires, at least one of which is a nanoscopic wire.

2. An article as in claim 1, wherein the at least two wires are in contact with each other.

3. An article as in claim 2, wherein the at least two wires are in electrical contact with each other.

4. An article as in claim 2, wherein the at least two wires are in van der Waals contact with each other.

5. An article as in claim 1, wherein the at least two wires are not in contact with each other.

6. An article as in claim 5, wherein a resistance between the at least two wires is detectable from a resistance between the at least two wires in van der Waals contact with each other.

7. An article as in claim 1, wherein the at least two wires comprise a first wire disposed adjacent a second wire at a junction.

8. An article as in claim 7, wherein the first wire is positioned on a substrate.

9. An article as in claim 8, wherein the first wire is positioned intermediate the substrate and the second wire.

10. An article as in claim 9, wherein the second wire is supported above the first wire, relative to the substrate.

11. An article as in claim 7, wherein the first wire is positioned in a trench in the

substrate.

12. An article as in claim 11, wherein the second wire is positioned across the trench.

13. An article as in claim 7, wherein the second wire has sufficient stiffness to remain free of contact with the first wire.

14. An article as in claim 13, wherein the second wire has a sufficient Young's modulus, such that the second wire is capable of deformable van der Waals contact with the first wire at the junction, upon exposure to a stimulus.

15. An article as in claim 14, wherein the first and second wires have sufficient adhesion energy to maintain deformable van der Waals contact upon removal of the stimulus.

16. An article as in claim 1, wherein the crossbar array comprises a first set and second set of at least two parallel wires.

17. An article as in claim 16, wherein the first set of parallel wires is perpendicular to the second set of parallel wires.

18. An article as in claim 16, wherein the second set of wires is disposed adjacent the first set of wires at a plurality of junctions.

19. An article as in claim 16, wherein the first set of wires is positioned in parallel trenches in the substrate.

20. An article as in claim 1, further comprising a contact electrode in electrical contact with at least one of the wires.

21. An article as in claim 20, wherein the at least one wire is attached to the contact electrode.

22. An article as in claim 20, wherein the at least one wire is covalently attached to the contact electrode.

23. An article as in claim 1, wherein each of the at least two wires is in electrical contact with a different contact electrode.

24. A method comprising:

forming a nanoscopic wire on a surface in a pattern dictated by chemically patterned surface.

25. A method as in claim 24, wherein the patterned surface includes a first portion of a first chemical functionality adjacent a second portion of a second, different chemical functionality.

26. A method as in claim 25, wherein at least one of the first portion and the second portion is defined by a self-assembled monolayer.

27. A method as in claim 24, wherein the nanoscopic wire is a pre-formed wire, the method comprising applying the pre-formed nanoscopic wire to the surface in the pattern.

28. A method as in claim 24, comprising growing the nanoscopic wire on the surface in the pattern.

29. A method as in claim 24, wherein the pattern comprises a plurality of catalytic colloid sites.

30. A method as in claim 24, wherein the pattern comprises a micro-phase separated block copolymer structure.

31. A method comprising:

growing a nanoscopic wire in the presence of an electric field of intensity sufficient to orient the growth of the wire.

32. A method as in claim 31, comprising growing the nanoscopic wire via CVD.

33. A method as in claim 31, comprising providing a catalytic site, creating the electric

field oriented in a predetermined direction relative to the catalytic site, and growing the nanoscopic wire catalytically from the site in the predetermined direction.

34. A method comprising:

forming a nanoscopic wire on a surface in a pattern dictated by a mechanically patterned surface.

35. A method as in claim 34, wherein the step of forming comprises inscribing a trench in the surface.

36. A method as in claim 35, wherein the nanoscopic wire is formed in the trench.

37. A method as in claim 34, wherein the step of forming comprises providing an article having a plurality of indentations and protrusions, and positioning the plurality of protrusions in contact with the surface so as to form cavities defined by the surface and the plurality of indentations.

38. A method as in claim 37, wherein the cavities comprise capillaries.

39. A method comprising:

forming a nanoscopic wire on a surface in a pattern dictated by gas flow.

40. A method as in claim 39, wherein the gas flow comprises reactants for the nanoscopic wire.

41. A method comprising:

providing a crossbar array comprising at least two wires in crossbar array orientation, the wires being free of contact with each other; and

bringing the wires into contact with each other.

42. A method as in claim 41, wherein the crossbar array includes at least one nanoscopic wire.

43. A method as in claim 41, wherein the at least two wires comprise a first wire disposed

adjacent a second wire at a junction.

44. A method as in claim 43, wherein the wires are brought into electrical contact with each other at the junction.

45. A method as in claim 43, wherein the wires are brought into van der Waals contact with each other at the junction.

46. A method as in claim 45, wherein the step of bringing the wires into contact with each other comprises deforming the second wire.

47. A method as in claim 43, wherein the first and second wires are brought into contact by applying a stimulus to at least the second wire.

48. A method as in claim 47, wherein the stimulus comprises biasing the first and second wires with opposite polarity.

49. A method as in claim 47, wherein the first and second wires maintain contact upon removal of the stimulus.

50. A method as in claim 43, further comprising releasing the wires from contact with each other.

51. A method as in claim 50, wherein the step of releasing comprises applying a stimulus to at least the second wire.

52. A method as in claim 51, wherein the stimulus comprises biasing the first and second wires with the same polarity.

53. A method as in claim 41, further comprising releasing the wires from contact with each other.

54. A method as in claim 53, wherein each of the steps of bringing the wires into contact and releasing the wires from contact comprises a switching step.

55. An article comprising:

a self-assembled monolayer defining a delineated pattern; and

at least two crossed wires associated with the self-assembled monolayer, at least one of the wires being a nanoscopic wire.

56. An article comprising:

an electrical crossbar array comprising at least two crossed wires defining a memory element able to be switched between at least two readable states, the device free of means addressing the memory element to effect switching of the memory element between the at least two states.

57. An article comprising:

an electrical crossbar array comprising at least two crossed wires defining a memory element able to be switched between at least two readable states, the device free of auxiliary circuitry defining the memory element.

58. An article as in claim 57, wherein the memory element comprises a junction of the two crossed wires.

59. An article as in claim 57, wherein the auxiliary circuitry includes transistors and capacitors.

60. A method comprising:

switching a memory element of a crossbar array between "on" and "off" states by alternatively biasing, at similar and opposite polarity, wires that cross in the array to define the element.

61. A method as in claim 60, comprising biasing the wires that cross to form the element from locations remote from the element.

62. A method as in claim 60, comprising switching the element between "on" and "off" states by bringing wires that cross in the array to form the memory element alternately into contact with each other and removing them from contact with each other.

63. An article comprising:

an electrical crossbar array comprising at least two crossed nanoscopic wires defining a memory element capable of being switched reversibly between at least two readable states.

64. An article as in claim 63, wherein the step of switching comprises biasing the at least two nanoscopic wires.

65. An article as in claim 63, wherein information stored in the memory element is volatile.

66. An article as in claim 63, wherein information stored in the memory element is non-volatile.

67. An article as in claim 63, wherein one readable state comprises the two wires in van der Waals contact.

68. An article as in claim 63, wherein the two wires have sufficient van der Waals adhesion to maintain contact.

69. An article comprising:

an electrical crossbar array comprising at least two crossed nanoscopic wires defining a memory element capable of being switched irreversibly between at least two readable states.

70. An article as in claim 69, wherein the step of switching comprises biasing the at least two nanoscopic wires.

71. An article comprising:

an electrical crossbar array comprising at least two crossed wires defining a memory element diode, the device being free of auxiliary circuitry defining the memory element diode.

72. An article as in claim 71, wherein the two crossed wires comprise a first wire

disposed adjacent a second wire at a junction.

73. An article as in claim 72, wherein the first wire is semiconductor.

74. An article as in claim 73, wherein the second wire is a metallic conductor.

75. An article as in claim 73, wherein the second wire is a semiconductor.

76. An article as in claim 73, wherein the second wire is a semiconducting nanotube.

77. An article as in claim 76, wherein the second wire is a metallic nanotube.

78. A method comprising:
providing a mixture of metallic nanotubes and semiconducting nanotubes; and
separating the metallic nanotubes from the semiconducting nanotubes.

79. A method as in claim 78, wherein the step of separating comprises subjecting the mixture to an electric field of intensity sufficient to selectively orient metallic nanotubes.

80. A method as in claim 79, wherein the electric field is of an intensity such that semiconducting nanotubes remain unoriented with respect to the electric field.

81. An article as in claim 1, wherein the nanoscopic wire is a nanotube.

82. An article as in claim 1, wherein the nanoscopic wire is an isolated nanotube.

83. An article as in claim 82, wherein the nanotube is single-walled.

84. An article as in claim 83, wherein the nanotube is a single-walled carbon nanotube.

85. An article as in claim 83, wherein the nanotube is a multiwall carbon nanotube.

86. An article as in claim 82, wherein the nanotube is a semiconducting nanotube.

87. An article as in claim 82, wherein the nanotube is a metallic nanotube.

88. An article as in claim 82, wherein the nanoscopic wire comprises a nanotube rope.

89. An article as in claim 82, wherein the nanoscopic wire is a nanowire.